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STUDIES ON NEARCTIC *Euchloe*.

PART 5. DISTRIBUTION.

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POPULATIONS OF THE NEARCTIC species of *Euchloe* occur from north of the Arctic Circle in Northwest Territories south to Baja California del Norte, Arizona, and New Mexico (30° North Latitude). In the west they occur to about 150° West Longitude in Alaska and to 80° West Longitude in Maryland to the east.

The four species of Nearctic *Euchloe* are single-brooded with one possible exception. Adults fly as early as January in San Diego County, California and as late as mid-August at high altitudes in Colorado.

Within the wide geographic and seasonal parameters mentioned above each species has narrower limits. The populations of each species possess flight period, behavior pattern, and host plant specificity characteristics that are met by only a small proportion of possible habitat spaces and times of the year. In this paper, I will summarize the information bearing on the distribution in time and space of *Euchloe creusa*, *Euchloe hyanthis*, and *Euchloe ausonides*. A later paper will give in detail the distributional features displayed by populations of *Euchloe olympia* (Clench and Opler).

SEASONAL DISTRIBUTION

Populations of *Euchloe ausonides* found in the lowlands of central California appear to be at least partially double-brooded as has been shown by Sette (1958). The basis for this assumption of bivoltinism is the bimodal distribution for a large number of adults plotted against date of collection. Collection records of 317 individuals collected in the counties bordering San Francisco Bay are summarized in Figure 1. The small "second brood" can be produced due to the permissive climate and pres-

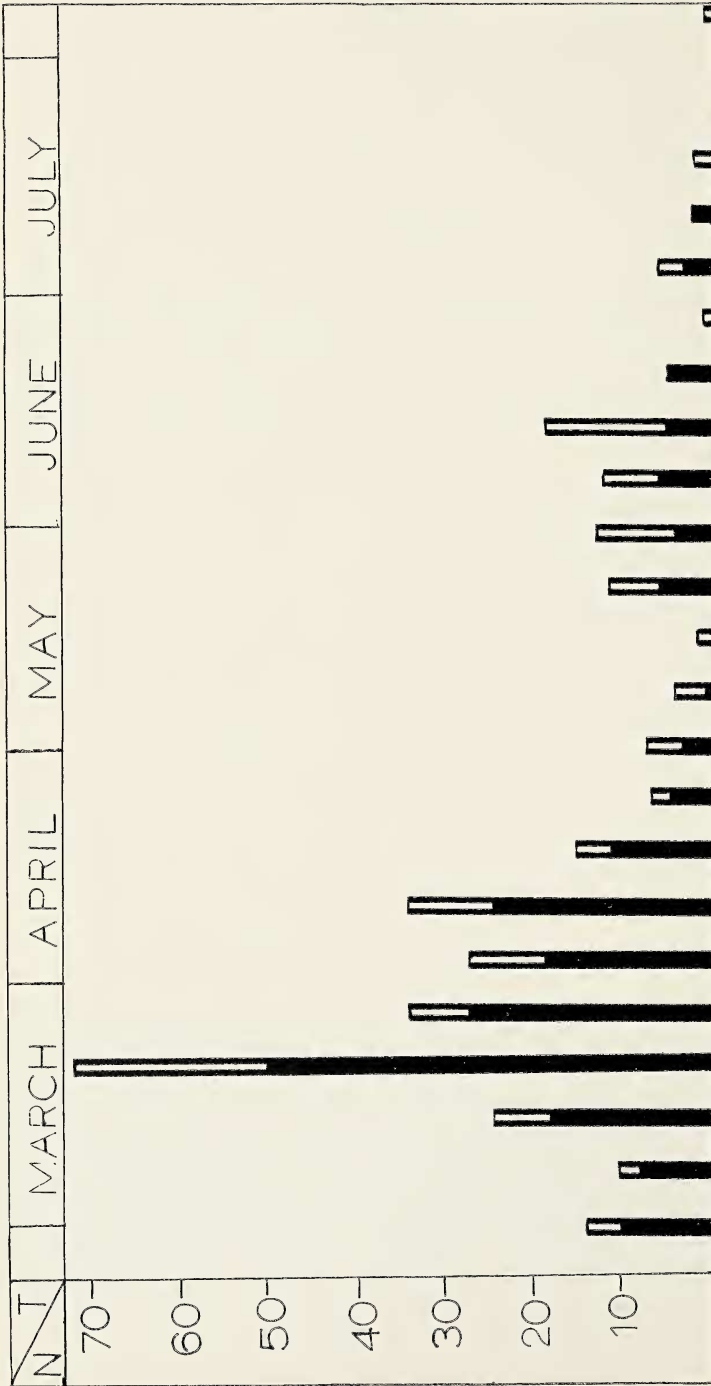


Fig. 1 Seasonal distribution of *Euchloe ausonides* in the San Francisco Bay Area, California. Solid portion of each bar represents number of males; open portion of each bar represents number of females.

ence of suitable host plants over a long period of time. Pupal diapause, which is normally obligatory for Nearctic *Euchloe*, must be facultative to allow those "second brood" individuals which do occur to complete development in the same year.

All other populations of *Euchloe* in the Nearctic Region are clearly single-brooded. The temporal distributions of all populations are determined by physical permissiveness of the environment and are coincident with the presence of appropriate cruciferous host plants in a suitable state of growth to serve as oviposition sites.

It is interesting to note the displacement of flight periods that occurs where *Euchloe ausonides* occurs in sympatry with or in proximity to each of the other three species. Populations of both *E. creusa* and *E. hyantis* can be seen to have earlier flight periods relative to *E. ausonides* in most instances. All examples of sympatry known to the writer are summarized below. Synchronic collections are also indicated.

SYMPATRIC OCCURRENCES WITH
EUCHLOE AUSONIDES

Locality

Dates of capture (inclusive)

<i>Euchloe creusa</i>	<i>Other species</i>	<i>Synchrony</i>	<i>E. ausonides</i>
Whitehorse, Yukon Terr., CANADA	vi-9	vi-9-66	v-29 to vii-5
AlCan Highway, MP 855 Brit. Col., CANADA	vii-1	vii-1-66	vii-1
Atlin, Brit. Col., CANADA	vi-7 to vi-28		vi-20 to vii-7
Nordegg, Alberta, CANADA	vi-5		vi-25
Banff vicinity, Alberta, CANADA	v-29 to vi-30		vii-4 to vii-9
Prince Albert, Sask., CANADA	v-27 to vi-2	v-27-51 vi-2-51	v-27 to vi-2
<i>Euchloe olympia</i>			
Clear Ck. Cyn., nr. Golden, Jefferson Co., Colo.	v-10		v-26
Lefthand Cyn., Boulder Co., Colo.	v-30		v-25
Sunshine Cyn., Boulder Co., Colo.	v-4		iv-27 to v-5

Euchloe hyantis

Lilooet, Brit. Col.,	iv-20 to iv-28		vi-18 to vi-25
Cranbrook, Brit., Col.,	iv-18 to v-30		v-9 to vii-9
CANADA			
Alta Lake,	iv-29	iv-29-51	iv-29
Okanogan Co., Wash.			
Baker, Baker Co., Ore.	v-20 to v-21		v-27
Ontario, Malheur Co.,	iv-30	iv-30-41	iv-30
Ore.			
Eureka, Juab Co., Utah	v-7 to v-29		v-23
Salt Lake City,	v-?		iv-18 to vi-13
Salt Lake Co., Utah			
Jackson Hole,	v-16 to v-23	v-20-24	v-20 to vi-17
Teton Co., Wyo.		v-23-24	
Mt. Wheeler,	v-19/24	v-19/24-29	v-19 to vi-8
White Pine Co., Nev.			
2 mi. N Mt. Shasta City,	vi-25 to vii-3	vii-3-55	vii-3
Siskiyou Co., Calif.			
Cloverdale,	iv-25		iv-15
Sonoma Co., Calif.			
Hallelujah Jct.,	vi-17	vi-17-67	vi-17
Lassen Co., Calif.			
Mono Lake,	vi-17	vi-17-19	vi-17
Mono Co., Calif.			
6 mi. W. Lone Pine,	iv-9	iv-9-60	iv-9
Inyo Co., Calif.			

GEOGRAPHIC DISTRIBUTION

The geographic distributions of *Euchloe ausonides*, *creusa*, and *hyantis* are presented as figures 2, 3, and 4 respectively. More specific locality information is given in the citation of collection data.

Euchloe ausonides, the species with the widest range, occurs sympatrically with each of the other three species at some points in their distributions, the instances known to this writer are listed above. In each case of sympatry some altitudinal or ecological information not shown on collection labels probably occurs to cause effective allopatry in the sense of the niche occupied by each species.

ECOLOGICAL DISTRIBUTION

Although no intensive ecological studies have been conducted on species of *Euchloe* several statements on the ecological attributes which appear to be important in determining the presence or absence of populations of *Euchloe* can be made.

One apparent common denominator of all populations is that they occur in open areas. The other important parameter is the occurrence of populations only where some feature of relief in the landscape occurs. These two features seem to be required

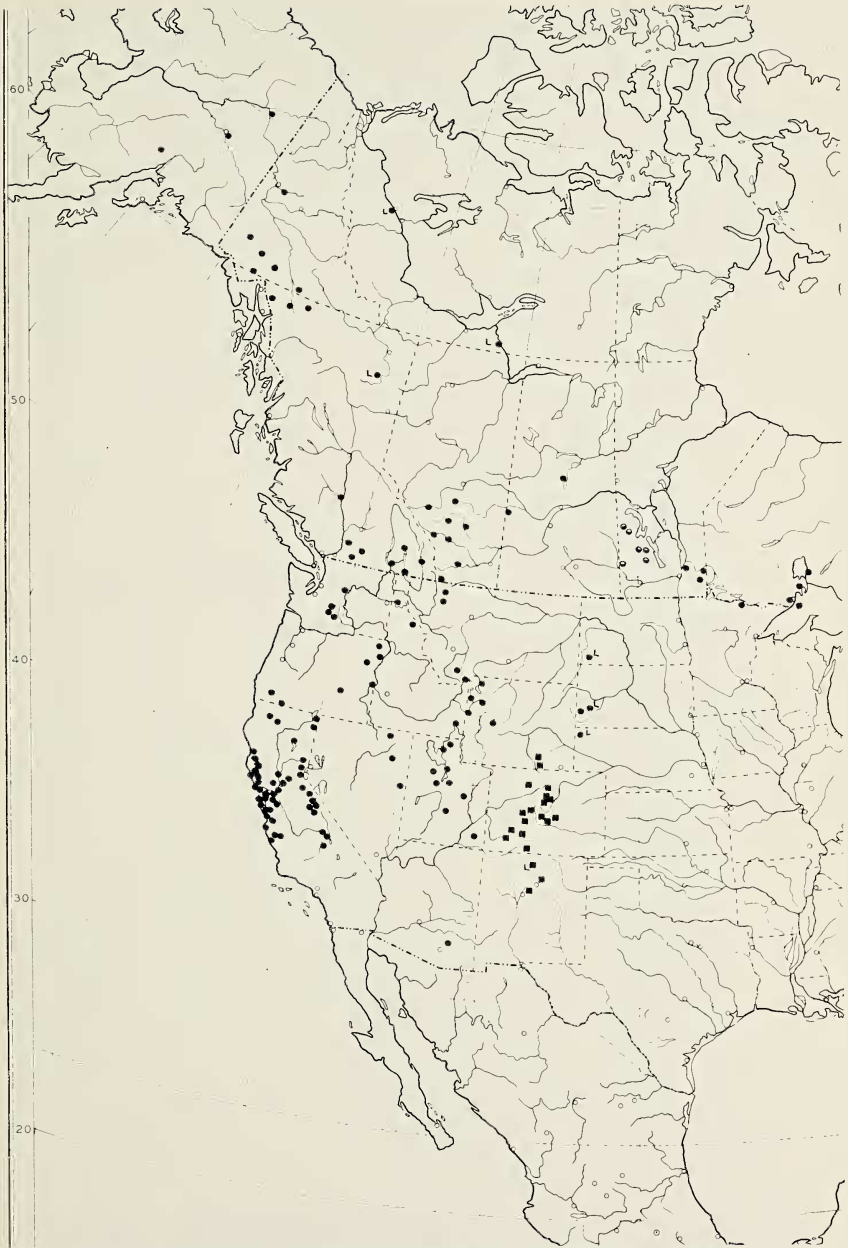


Fig. 2. Geographic distribution of *Euchloe ausonides*. Solid circles represent localities for nomenotypic *E. ausonides*, half-open circles represent localities for *E. ausonides mayi*, and solid squares represent localities for *E. ausonides coloradensis*. An "L" next to a symbol designates probable occurrences based on reports in the literature.

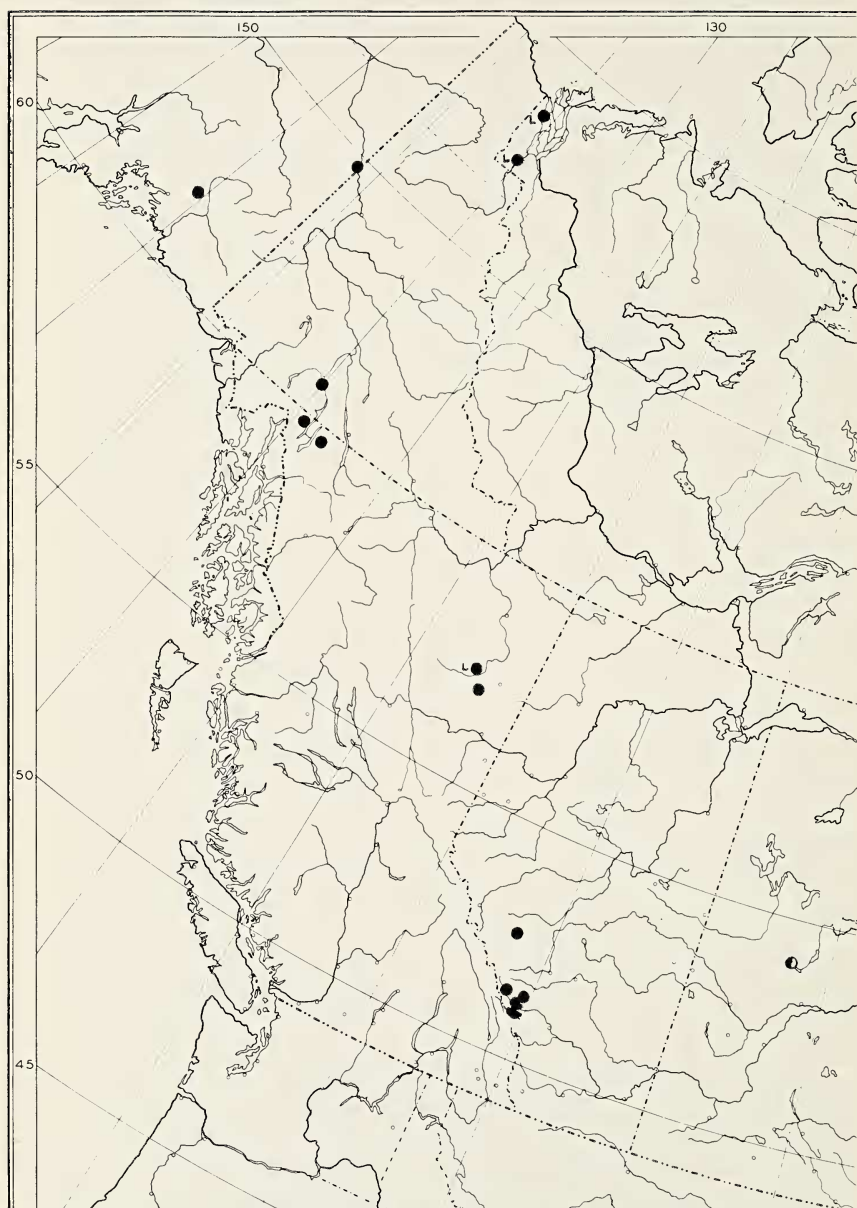


Fig. 3. Distribution of *Euchloe creusa*. Solid circles represent localities for the nomenotypic race; the half-open circle represents the occurrence of a distinctive segregate at Prince Albert, Saskatchewan.

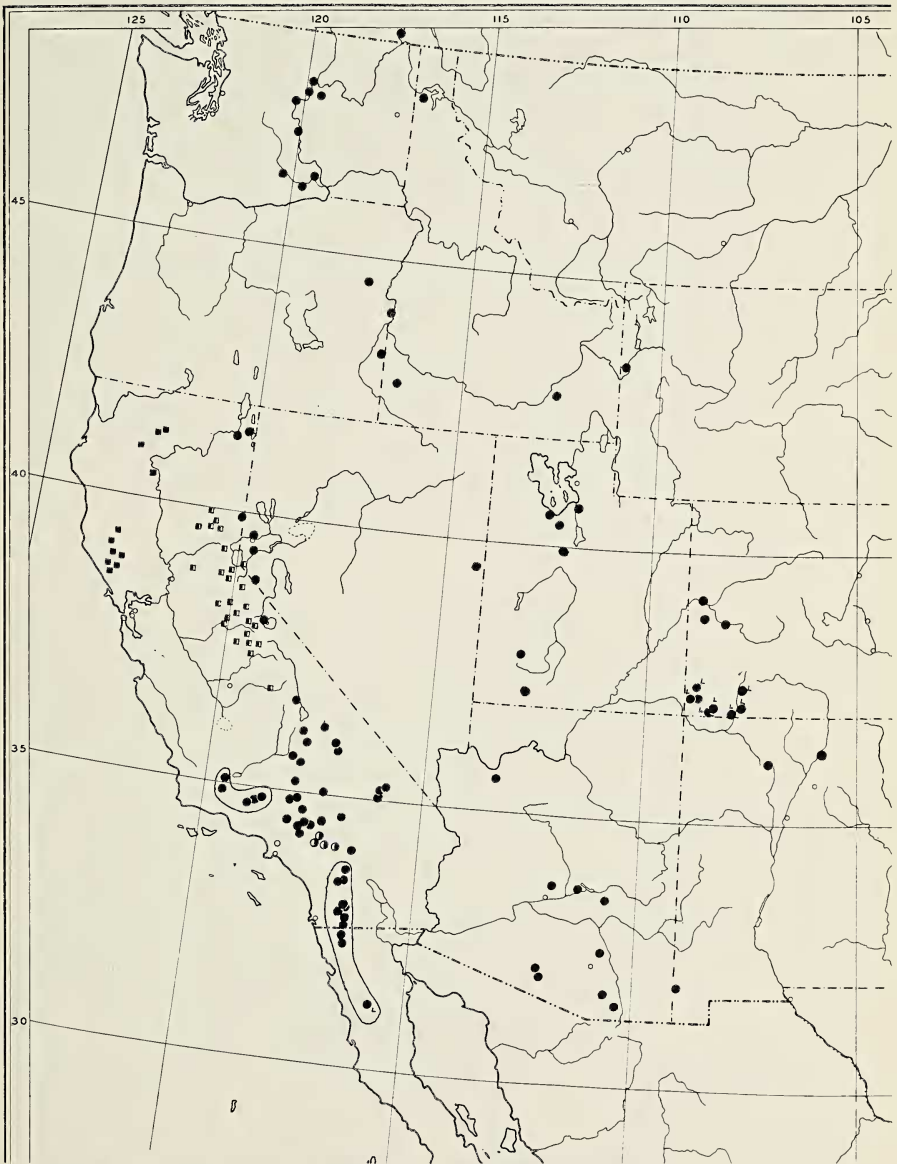


Fig. 4. Geographic distribution of *Euchloe hyantis*. Solid squares represent localities for the nomenotypic race; half-open squares represent the Sierra Nevadan populations; half-open circles represent localities for *E. hyantis andrewsi*; solid circles represent localities for all populations tentatively referable to *E. hyantis lotta*. The two groups of circles circled in black represent the "Mt. Pinos Block segregate" and the "Peninsular Ranges Segregate." Collection records for this species at Cranbrook and Oliver, British Columbia do not appear on this map.

to serve as keys to behavior patterns displayed by adults and to prevent loss of contact that might occur in "unbroken landscape." Thus, some populations appear keyed to "hill-tops," others to sunny, open areas on hillsides, and still others to river courses or dry stream beds. I have observed populations of *Euchloe ausonides* or *E. hyantis* keyed to each of these situations. The preferred habitat of *Euchloe creusa* in the vicinity of Banff, Alberta is on the talus slopes of lateral moraines.

It should be further noted that there appears to be ecological displacement whenever two species of *Euchloe* occur in close spatial proximity. This displacement may take the form of flight behavior, altitudinal occurrence, or host plant selection differences or any combination of the three. In areas where species of *Anthocharis* and *Pieris* occur with *Euchloe*, very complex interactions of an ecological nature must occur indeed. I believe that a proper description of the ecological characteristics of the crucifer feeding species of Pieridae in the Nearctic Region must await more careful field studies than have been made by this author.

SPECIMENS EXAMINED

The data for specimens seen during this study to date are listed below. For *Euchloe ausonides* in the vicinity of San Francisco Bay, California and for *Euchloe ausonides coloradensis* in Colorado where records are extremely numerous only county names and ranges of collection dates are given. Collections are abbreviated as follows: American Museum of Natural History (AMNH), David L. Bauer, (DLB), California Academy of Science (CAS), California Insect Survey, University of California (CIS), Glenn Gorelick (GG), John Lane (JL), Nevada State Museum (NSM), J. W. Tilden (JWT), Los Angeles County Museum (LACM), Noel La Due (NLD), Oakley Shields (OAS), Fred Thorne (FT), and Paul Opler (PAO).

LITERATURE CITED

CLENCH, H. K. and P. A. OPLER, in preparation. Bionomics of *Euchloe olympia*.

Euchloe ausonides ausonides

CANADA. - ALBERTA. vic. Banff, ♀, vii-4/9-30 (J. F. May, AMNH); Calgary, 7♂♂, 3♀♀, vi-1-03, vi-4-?, vi-6-03, vi-13-?, vi-14-?, vi-20-?, vi-27-?, vii-3-04, vii-8-04 (C. Garrett, AMNH); Carbon, 4♂♂, 3♀♀, v-31-?, vi-6-?, vi-23-04, vi-27-? (C. Garrett, AMNH); Didsbury, 3♂♂, ♀, vi-7-?, vi-10-06, vi-16-? (C. Garrett, AMNH); Lacombe, 2♂♂ (J. A. Comstock, LACM); Lethbridge, 1♂, vi-3-29 (J. H. Pepper, AMNH); Nordegg, 1♂, vi-25-21 (J. McDunnough, AMNH); Waterton Lakes, 2♀♀, vi-27-23, vi-21-23.

BRITISH COLUMBIA. Alaska Highway, MP836, 1♀, vii-1-66 (J. Lane, JL); Alaska Highway, MP 855, 1♂, 1♀, vii-1-66 (J. Lane, JL); A tlin, 1♂, vi-22-? (AMNH); Atlin, Wilson Crk., 1♂, 1♀, vi-20-14, vi-22-14 (AMNH); Atlin, 3♂♂, vi-27-29, vii-3-29 (G. Swarth, CAS); Cranbrook, 9♂♂, v-9-12, v-15-10, v-22-10, vi-12-?, vi-13-17, vi-15-?, vi-27-?, vii-2-?, vii-9-? (C. Garrett, AMNH); Creston, 2♂♂, vii-4-?, vii-12-? (AMNH); Lillooet, 1♀, vi-18/25-30 (Herr, AMNH); Nelson, 2♂♂, 1♀, v-9?, vi-7-? (AMNH); Princeton, 1♀, vi-?-43 (T. Menzies, CAS); 25mi. N. Princeton, 3400', 1♂, vii-27-66 (J. Lane, JL); Robson, 1350', 2♂♂, v-?-34 (AMNH); Robson, 3♂♂, iv-20-41, iv-30-39, v-31-39 (H. F. Foxlee, AMNH); Summerland, 1♂, v-31-? (AMNH); MANITOBA. Brokenhead, 7♂♂, 5♀♀, v-22/vi-4-36, vi-3-30 (AMNH, LACM); Red Rock Lake, Whiteshell Provincial Park, 1♂, 3♀♀, v-24-55, v-29-53, vi-13-54 (C. Bird, AMNH); Sandilands Provincial Forest, 8mi. SE Richer, 6♂♂, v-28-67 (J. H. Masters, PAO). ONTARIO. 3 mi. E. Beardmore, 3♂♂, vi-1-58 (P. D. Syme, AMNH); Ft. Williams, 1♀, vi-8-61 (G. Perrons, AMNH); Neebing, 1♂, ?-?-61 (W. Hartly, AMNH). SASKATCHEWAN. Nesbit Prov. Forest, Prince Albert, 2♂♂, 3♀♀, v-27-51, vi-2-51 (Aschim, AMNH); Rivercourse, 1♀, 2♀♀, v-24-41, v-25-41 (AMNH). YUKON TERRITORY. Alaska Highway, MP 1032, 3000', 1♀, vii-15-66 (J. Lane, JL); Alaska Highway, MP 1105, 2400', 2♀♀ (P. R. Ehrlich, AMNH); Whitehorse, 1♂, vii-5-30 (D. Fraser, AMNH), 14♂♂, 16♀♀, vi-6/9-23, vi-27-33 (J. A. Kusche, AMNH), 11♂♂, 4♀♀, v-29/vii-1-66 (J. A. Ebner, PAO).

UNITED STATES. - ALASKA. Alfred Creek Camp, 1♂, vii-15-22 (Pope, LACM), 1♂, 1♀, vi-4-02 (AMNH); Fort Yukon, 1♂, vi-12-17 (CAS), 2♂♂, 4♀♀, vi-?-19 (J. A. Kusche, LACM); Forty Mile Highway, 44 miles from east end, 1♀, vii-14-66 (J. Land, JL); Haine's Highway, MP 93, 1♂, vii-5-52 (Carson, AMNH); McKinley National Park, 27♂♂, 18♀♀, vi-13/21-31 (F. Morand, AMNH, LACM); Taylor Highway, Dawson Jct., 3500', 1♂, vii-4-55 (P. R. Ehrlich, AMNH). ARIZONA, PIMA CO. : Bear Canyon, 1♂, iv-9/17-31 (L. Martin, AMNH). CALIFORNIA. ALAMEDA CO. : (many records, see fig. 1). ALPINE CO. : rocks over Carson Pass, 8400', 2♂♂, vii-2-62, vii-4-63 (N. La Due, NLD). CONTRA COSTA CO. : (Many records

see fig. 1). EL DORADO CO.: China Flat, 5000', 1♂, vi-28-48, (W. E. Kelson, CIS). FRESNO CO.: nr. Rae Lakes, 11,000', 1♂, vii-22-35 (C. W. Anderson, CIS). INYO CO.: Alabama Hills, 6 miles west Lone Pine, 1♂, iv-9-60 (R. L. Langston, CIS). LAKE CO.: Clear Lake, 1♀, v-17-65 (G. Gorelick, GG). MARIN CO.: (Many records, see fig. 1). LASSEN CO.: 1 mi. W. Hallelujah Jct., 1♂, vi-18-67 (G. Gorelick, GG). MODOC CO.: Cedar Pass, 6350', vii-15-65 (R. L. Langston, CIS), 1♀, vi-26-58 (J. W. Tilden, JWT); Willow Ranch, 1♂, vii-10/20-28 (AMNH). MONO CO.: nr. Monitor Pass, 1♂, vi-23-62 (J. Powell, CIS); Mono Lake, 1♂, vi-17-19 (AMNH); Silver Lake, 2♂♂, v-17-36, vi-9-35 (LACM). MONTEREY CO.: 5 mi. S. Big Sur, 2♂♂, v-10-58 (P. A. Opler, PAO); Carmel Vy., Hasting's Reservation, 2♀♀, v-10-59 (P. A. Opler, PAO); Carmel Vy., Tularcitos Ranch, 1♀, iv-27-55 (J. Powell, CIS); Chew's Ridge, nr. Carmel, 2♂♂, vi-3-31 (LACM). NAPA CO.: Calistoga, 1♀, v-6-16 (W. N. W. Whole, CAS); Mt. Veedar Rd., 1♂, iv-27-58 (P. A. Opler, PAO); 3 mi. W. Oakville, 1♀, v-30-60 (P. A. Opler, PAO). NEVADA CO.: Wolf Creek, 1400', 1♀, iv-23-63 (N. La Due, NLD). PLACER CO.: 3 mi. W. Auburn, North Fork American River, 2♂♂, iv-9-57, iv-22-63 (N. La Due, NLD); Lake Tahoe, 1♀, vii-2-30' (CIS); between Roseville and Rocklin, 200', 1♀, iv-11-61 (N. La Due, NLD). PLUMAS CO.: Beckworth Pass, 1♂, vi-18-67 (G. Gorelick, GG); Half Moon Lake, 1♂, vii-2-67 (G. Gorelick, GG), 1♀, vi-6-61 (N. La Due, NLD); Coloma Road, south of Fair Oaks, 10♂♂, iii-13-61 (N. La Due, NLD); Fair Oaks, 2♂♂, iii-24-59, iv-16-58 (N. La Due, NLD); south of Fair Oaks, 5♂♂, 3♀♀, iii-12-62, iii-14-61, iii-20-61, iii-21-60, iv-9-62, iv-15-58 (N. La Due, NLD); 7 mi. S. Isleton, 1♂, iv-1-50 (R. L. Langston, RLL); North Sacramento, 2♀♀, iv-5-60, v-26-59 (N. La Due, NLD); Rancho Cordoba, 5♂♂, iv-60 (L. C. Clarke, PAO). SAN FRANCISCO CO.: (many records, see fig. 1). SAN JUAQUIN CO.: 5 mi. SE Tracy, 1♀, v-36-44 (R. Smith, CIS). SAN MATEO CO.: (many records, see Fig. 1). SANTA CRUZ CO.: Santa; Cruz, 1♂, 4♀♀, iii-3-31, iv-7-38, iv-10-38, vi-8-31 (W. C. Wood, AMNH). SISKIYOU CO.: Gazelle, 2♀♀, vi-24-58' (F. Powell, CIS); Shasta Mdws., 2 mi. N. Shasta City, 3♂♂, vii-3-58 (N. La Due, NLD). SOLANO CO.: Glen Cove, Carquinez Strait, 3♂♂, vi-2-66, vi-5-65 (R. L. Langston, PAO, CIS); Vallejo, 2♂♂, 3♀♀, vi-2-62, vi-8-63 (R. L. Langston, CIS). SONOMA CO.: Cloverdale, 2♂♂, 1♀, iv-15-56 (R. P. Allen, CAS, CIS); Eldredge, 2♂♂, 2♀♀, v-16-17, iv-2-17 (J. A. Kusche, LACM); Healdsburg, 1♂, iii-25-53 (R. P. Allen, CIS); Jenner, 1♂, vii-2-59 (R. L. Langston, CIS); 2 mi. S. Jenner, 1♀, iv-24-60 (P. A. Opler, PAO); meadows east of Mark West Springs, 1♂, v-9-60 (N. La Due, NLD); Petaluma, 1♂, 1♀, v-26-49 (R. P. Allen, CIS); Petrified Forest, 1♀, iv-25-61 (La Due, NLD);

Russian River, 2♂♂, iii-23-33 (J. A. Comstock, LACM).
 MENDOCINO CO.: hills west of Boonville, 1♀, vi-1-57 (J. A. Powell, CIS). TULARE CO.: South Fork Kern River, nr. Deer Mountain, 1♂, v-31-47 (C. Smith, CIS). TUOLUMNE CO.:
 Locality unknown, 1♂, vii-21-30 (Bohart, CAS); Sonora Pass, 9600', 1♂, vii-5-65 (N. La Due, NLD); Sonora Pass, Deadman Creek, 3♂♂, 1♀, vii-3-59 (P. A. Opler, PAO); Tioga Pass, Yosemite N. P., 2♂♂, 2♀♀, vii-13/16-34 (AMNH). YOLOCO.: Knight's Landing, 1♀, v-?-54 (N. La Due, NLD); 10 mi. W. Winters, Putah Ck., 1♀, v-24-66 (P. Opler, PAO); Yolo Eypass, nr. Eryte, 2♂♂, iv-6-48, 1♂, iv-11-48 (C. D. MacNeill, CIS); Yolo Bypass, nr. Davis, 1♂, iv-20-30 (C. W. Herr, AMNH); Priest R., 1♂, v-9-27 (AMNH), 2♂♂, v-10/19-26 (C. W. Herr, AMNH). CARIBOU CO.: Soda Spgs., 1♂, 1♀, vi-23/24-33 (G. H. and J. L. Sperry, AMNH). SHOSHONE CO.: Wallace, 1♂, v-17-25 (AMNH). MINNESOTA. ST. LOUIS CO.: Ash River Trail, 1♂, vi-17-67 (J. H. Masters, POA). MONTANA. GLACIER CO.: Ptarmigan Tunnell, Glacier N. P., 7200', 1♂, vii-26-64 (J. G. Edwards, JGE); Swiftwater L., Many Glacier Chalet, Glacier N. P., 1♀, vii-4-30 (E. C. Van Dyke, CAS). NEVADA. ELKO CO.: vic. Arthur, 1♂, vi-20/30-29 (E. Schiffel, AMNH); Jarbidge Mts., 1♂, 1♀, vii-12-64 (J. Lane, JL); Wells, 1♂, v-23-54 (M. Cazier, AMNH). WHITE PINE CO.: Mt. Wheeler, 17♂♂, 13♀♀, v-19/24-29, v-30-29, vi-2/6-29, vi-8/10-29 (F. W. Morand, AMNH). OREGON. BAKER CO.: Baker, 3300', 1♂, v-27-57 (J. H. Baker, AMNH); Pine Ck., 4100', 1♀ vii-7-57 (Tilden, JWT). HARNEY CO.: Devine Cyn., Hwy. 395, 12 mi. NNE Burns, 4800', 1♂, vi-1-65 (R. L. Langston, RLL). JACKSON CO.: Siskiyou Summit, 4522', 1♂, vii-2-58 (R. L. Langston, CIS). JOSEPHINE CO.: Green Mtn. Spgs. Summit, 1♀, vi-10-64 (Tilden, JWT). MALHEUR CO.: Ontario, Huntington Rd., 1♂, iv-30-41 (CAS). WALLOWA CO.: Chief Joseph Mtn., 2♀♀, vii-4-52, vii-8-52 (Sperry, AMNH); Joseph, 4500', 2♀♀, vii-?-54 (N. Crickmer, AMNH); Wallowa L., 4500', 1♂, 1♀, vi-14-39 (CAS). SOUTH DAKOTA. LAWRENCE CO.: vic. Clayton Draw, 6500', 6♂♂, vi-17-67 (J. Nordin, PAO); Spearfish cyn., 3♂♂, 2♀♀, vi-26-39, vii-1-? (AMNH). UTAH. CACHE CO.: Logan, 1♂, vi-12-33 (AMNH). DAVIS CO.: Mueller Park, 5600', Wasatch Mts., 6♂♂, 2♀♀, v-16-63, v-18-63 (K. Tidwell, OAS); Mueller Park, 5400', Wasatch Mts., 1♂, v-2-63 (K. Tidwell, OAS). ELDER CO.: nr. Grigham, 1♂, 2♀♀, vii-7/8-25 (LACM). EMERY CO.: Mohrland, 1♂, vi-23-? (O. S. Johnson, AMNH). JUAB CO.: Eureka, 1♂, v-23-20 (T. Spalding, AMNH). SALT LAKE CO.: Salt Lake City, 2♂♂, iv-18-43 (T. B. Ziegler, AMNH); Salt Lake City, City Creek, 6♂♂, 1♀, iv-22-40, v-11-30, vi-13-44 (CAS, LACM). SAN JUAN CO.: La Sal Mts., Burro Pass, 10,500', 1♂, vii-22-36 (AMNH); La Sal Mts., Gold Hill, 10,600', 1♂, 1♀, vii-11-33 (A. G. Richards, jr., AMNH). SEVIER CO.: Fish L., 1♂, vii-17-49 (Gertsch, AMNH). TOOELE CO.: 13 mi. SW Grantsville, Loop Camp, 7400', 1♂, vii-3-60 (Rindge, AMNH). UTAH CO.: Dividend, 1♂, v-7-? (T. Spalding, AMNH); Payson

Cyn., 3♂♂, vi-19-33, vi-22-33, vii-7-33 (AMNH); Provo, Slate Cyn., 1♂, v-14-19 (Spalding, AMNH); Vineyard, 2♂♂, 2♀♀, v-22/24-22 (T. Spalding, AMNH). WASHINGTON. OKANAGAN CO.: Alta L., 2♂♂, iv-29-51 (A. Anderson, RLL). YAKIMA CO]: Bear Cyn., 2800', 2♂♂ (E. J. Newcomer, AMNH); Bear Cyn., 3200', 1♂, vi-17-62 (E. J. Newcomer, AMNH); Little Naches R., 1♀, v-29-59 (E. J. Newcomer, AMNH); Mill Ck., 1400', 1♂, iii-31-62 (E. J. Newcomer, AMNH); Mill Ck., 1500', 1♀, v-16-62 (E. J. Newcomer, AMNH); Mill Ck., 1800', 1♂, iv-11-62 (E. J. Newcomer, AMNH); Oak Ck., 3000', 1♀, vi-13-62 (E. J. Newcomer, AMNH); Wenas Ck., 1800', 1♀, v-14-60 (E. J. Newcomer, AMNH); Wenas Ck., 2000', 4♂♂, iv-26-61 (E. J. Newcomer, AMNH). WYOMING. TETON CO.: Grand Teton N. P., 6700', 1♀, vi-30-53 (J. A. Ebner, RLL); Jackson Hole, 1♂, vi-17-49 (CAS); Jackson Hole, Moose P. O., 2♂♂, v-20-24, v-23-24 (A. B. Klots, AMNH); base of Teton Range, 1♀, vii-11-25 (LACM); Togwottee Pass, 2♂♂, vi-21-41 (CAS); Yellowstone N. P., Dunraven Pass, 1♂, 1♀, vi-25-30 (VanDyke, CAS); Yellowstone N. P., Roosevelt Camp, 4♀♀, vii-26-30 (E. C. Van Dyke, CAS); Yellowstone N. P., Roosevelt Lodge, 1♀, vii-3-38 (E. C. Van Dyke, CAS); Yellowstone N. P., Tower Falls Rd., 1♀, vi-7-37 (CAS); Yellowstone N. P., west entrance, 1♀, vi-14-30 (E. C. Van Dyke, CAS). SUBLETTE CO.: Willow Ck. Rgr. Sta., 8000-8900', 1♂, vii-14-39 (Klots, AMNH).

Euchloe ausonides coloradenses (Hy. Edwards)

COLORADO. county unknown: 4♂♂ (AMNH), 1♂, vii-25-55 (Renk, PAO), 1♂ (T. L. Mead, AMNH). BOULDER CO.: Boulder, 2♂♂, vi-8-22, vii-5-02 (AMNH, LACM); Four Mile Cyn., 1♂, vi-28-52 (D. Eff, JWT), 1♂, 2♀♀, v-6-62, v-28-61 (D. Eff, OAS); Gregory Cyn., 1♀, v-19-64 (D. Eff, OAS); Lefthand Cyn., 2♀♀, v-30-57, vi-8-57 (D. Eff, JWT), 1♂, v-25-57 (D. Eff, OAS); Magnolia Rd., 2♀♀, v-30-54 (D. Eff, JWT); Mesa Trail, Boulder, 1♂, v-12-54 (D. Eff, JWT); Packer's Gulch, 1♀, vi-8-57 (D. Eff, JWT), 3♂♂, 1♀, v-6-62, v-16-63, v-28-61 (D. Eff, OAS); Sunshine Cyn., 2♂♂, 1♀, iv-27-61, v-5-62 (D. Eff, OAS). CLEAR CREEK CO.: Beaver Ck., Hwy. U. S. 40, 1♂, vi-18-60 (J. Scott, OAS). 3♂♂, vii-6-61 (Rindge, AMNH). DOLORES CO.: Rico, 1♂, vii-?-? (Oslar, AMNH); Rock Ck., vic Colorado Springs, 8500-8700', 6♂♂, vi-5-38, vi-26-41, vi-30/vii-4-39, vii-4-38 (A. B. Klots, AMNH). GILPIN CO.: Hideaway Park, 8715', 1♀, vi-23-54 (L. Martin, LACM). GUNNISON CO.: Almont, 2♂♂, 1♀, vi-20/30-25 (AMNH); 10-20 mi. SE Crested Butte, Cement Ck., 9800-11,000', 1♂, 1♀, viii-8-61 (Rindge, AMNH). JEFFERSON CO.: Clear Ck. Cyn., 1♀, v-26-63 (D. Eff, OAS); Golden, Chimney Gulch, 1♂, iv-20-04 (Oslar, AMNH); Indian Hills, 1♂, v-14-38 (AMNH); Mother Cabrini Shrine, 1♀, vi-18-60 (J. Scott, OAS). LARIMER CO.: Estes Park, 2♂♂, 1♀, vi-10-44, vi-16-44 (CAS); Long's Peak, 2♂♂, vi-15-22 (AMNH); Red Feather

Lakes, 8000', 4♂♂, vi-19-29 (A. B. Klots, AMNH); Rocky Mtn. N. P., 3♂♂, vi-?-31 (J. L. Sperry, CAS, LACM), 1♂, viii-15-37 (A. B. Klots, AMNH), 1♂, 2♀♀, vii-3-35 (L. Hulbirt, JWT). MINERAL CO.: locality unknown, 1♂, vii-1-40 (AMNH). PARK CO.: Elk Ck., 8500', 1♂, vi-4-60 (J. Scott, OAS); Hall Vy., 1♂, vi-15-02 (LACM); Hall Vy., 10, 00'-10, 500', 4♂♂, 1♀, vii-2/3-41, vii-13/15-35 (A. B. Klots, AMNH); South Park, 1♂, vii-29-04 (Oslar, AMNH). ROUTT CO.: Steamboat Springs, 6000', 1♂, vii-4-50 (Lot, CAS). SAN MIGUEL CO.: Ophir, 1♂, vii-?-14 (AMNH); San Miguel, 1♂, (Oslar, AMNH); Telluride, 1♂, vi-15-04 (LACM); Telluride, Cornet Ck., 11, 000', 1♂, vii-9-19 (AMNH). SUMMIT CO.: Fremont Pass, 11, 316', 1♂, 1♀, vi-22-54 (Martin, LACM). TELLER CO.: Green Mtn. Falls, 10, 000', 2♂♂, vii-1/7-? (AMNH). NEW MEXICO. county unknown: Aspen Ranch, Sangre de Cristo Range, 9000', 1♂, vi-30-35 (A. B. Klots, AMNH). BERNALILLO CO.: San Antonio, 1♂, vii-9-36 (R. Kaiser, AMNH). SAN MIGUEL CO.: Cowles, Windsor Cyn., 8000-8500', 1♂, 1♀, vii-3-35 (A. B. Klots, AMNH). WYOMING. ALBANY CO.: Centennial, Univ. Wyoming Camp, 9600', 9♂♂, 8♀♀, vi-26/vii-6-29 (A. B. Klots, AMNH, CIS); Woods Landing, 1♂, vi-18-55 (G. DeFoliart, JWT).

Euchloe ausonides mayi Chermock and Chermock

CANADA. - MANITOBA, Beulah, 2♂♂, vi-20-37 (AMNH); Duck Mountain Provincial Park, 1♂, 1♂, vii-1-36 (J. S. Nordin, PAO); Duck Mountain Provincial Park, vic. Ketchum Hill, 2♂♂, vii-15-67 (J. H. Masters, PAO); Herchman, mi. 412, 2♂♂, vi-23-32, vi-24-32 (AMNH); McCreaf, 1♂, vi-22-38 (AMNH); Riding Mts., 2♂♂, vi-18-37, vi-29-34 (F. H. and R. L. Chermock, AMNH) PARATYPES, 1♀, vi-8-36 (AMNH), 2♀♀, vi-27-32 (J. F. May, LACM); Riding Mts., Kelwood, 1♀, vi-12-31 (CAS), 1♂, 1♀, vi-2/26-29 (J. F. May, AMNH); Riding Mts., Trail to Grey Owl's Cabin, 6♂♂, vii-24-67 (J. H. Masters, PAO); Riding Mountain National Park, 1♀, vi-19-60 (J. F. May, AMNH) AMNH); Sand Ridge, 1♂, vi-11-? (AMNH) PARATYPE, 2♂♂, vi-26-36 (AMNH).

Euchloe creusa creusa (Doubleday)

CANADA. - ALBERTA, Banff, 1♂, vi-21-25 (G. P. Englehardt, AMNH), 1♂, v-29-22 (C. B. D. Garrett, LACM); vic Banff, 2♂♂, vi-21/31-29 (J. F. May, AMNH); Banff, Cascade Mtn, Amphitheatre, 7000', 1♀, vi-29-25 (O. Bryant, AMNH); Banff, Rundle Mtn., E face, 5000'-7000', 1♂, vi-25-25 (O. Bryant, AMNH); Bow Lake, 2♂♂, vi-7-23 (G. C. Hall, AMNH); Laggan, 1♂,

vii-1-17 (AMNH); Nordegg, 1♀, vii-1-66 (J. Lane, JL); Atlin, 6♂♂, vi-7-?, vi-20-?, vi-21-?, vi-28-? (AMNH). YUKON TERRITORY. Whitehorse, 1♂, vi-9-23 (LACM), 1♂, 1♀, vi-9-66 (J. A. Ebner, PAO).

UNITED STATES. - ALASKA. Eagle, 1♂, vi-8-36 (F. Grinnell, LACM); Klutina Lake, 2♂♂, v-15-50 (W. C. Frowne, DLB).

Euchloe creusa, Saskatchewan segregate

CANADA. - SASKATCHEWAN. Prince Albert, Nesbit Provincial Forest, 5♂♂, 3♀♀, v-27-51, vi-2-51 (Aschim, AMNH).

Euchloe hyantis hyantis (Edwards)

CALIFORNIA. HUMBOLDT CO.: locality unknown, 1♂, no date (Hy. Edwards, AMNH), 1♀ (Koebele, CAS). LAKE CO.: 9 mi. N Upper Lake, 1♂, iv-4-62 (Langston, RLL). MENDOCINO CO.: Hopland, 2♀♀, v-14-32 (CIS). SHASTA CO.: Redding, 1♂, 1♀, iii-2-63, iii-12-63 (D. L. Bauer, DLB). SISKIYOU CO.: Castle Lake, 2♂♂, 1♀, vii-12-58 (J. Powell, CIS); Lake Mountain, 1♂, vii-4-63 (P. A. Opler, PAO); nr. Mt. Shasta, 1♀, vi-10-41 (CIS); Selad, 1♀, v-8-59 (R. P. Allen, CAS); n mi. N Mt. Shasta City, 2♂♂, 1♀, vi-25-58 (J. Powell, CIS), 1♂, vii-3-58 (N. La Due, NLD). SONOMA CO.: locality unknown, 1♂, iv-17-38 (LACM); Cazadero, 1♂, 1♀, iv-17-30 (CAS, CIS), 1♂, 1♀, v-3-31 (W. C. Wood, AMNH), 2♂♂, 1♀, v-19-29 (Bohart, CAS); Cloverdale, 1♂, iv-25-57 (R. P. Allen, CAS); 2 mi. E Du ncan Mills, 1♂, 1♀, vi-1-57 (R. L. Langston, RLL); Geysers, 1♂, v-10-38 (E. C. Johnston, AMNH), 1♂, iv-8-61 (Tilden, JWT), 1♂, iv-22-59 (M. Doudoroff, CIS); 3 mi. NE Guerneville, 2♂♂, iv-8-55 (Langston, RLL). TRINITY CO.: Trinity Center Delta, Trinity Mts., 1♀, v-22-25 (R. F. Sternitzky, AMNH).

Euchloe hyantis, Sierra Nevada segregates

CALIFORNIA, county unknown: Locality unknown, acc. no. 3576, 1♂, no date (Hy. Edwards, AMNH); Feather River, 7♂♂, 5♀♀, vii-4/18-28 (AMNH), 2♂♂, iii-25-32 (AMNH); Lake Tahoe, 1♂, vi-11-35 (AMNH), 1♂, vi-13-30 (R. F. Sternitzky, CAS), 1♂, v-29-30 (LACM); Sierra Nevada, acc. no. 4278, 1♂ (Hy. Edwards, AMNH); Yosemite, acc. no. 4278, 2♂♂ (Osten Sacken, AMNH); Yosemite N. P., 1♂, v-13-27 (CAS); Yuba River, 1♀, v-29-27 (CAS). ALPINE CO.: Hope Vy., 5♂♂, vi-9-48 (J. W. MacSwain, CIS). AMADOR CO.: peaks over Carson Spur, 8200', 4♂♂, vi-20-61 (N. La Due, NLD); rocks over silver Lake, 8000', 2♂♂, 1♀, vi-19-61, vii-2-62 (N. La Due, NLD). CALAVERAS CO.: Camp Wolfeforo, B. S. A., N. Fk. Stanislaus River, 5600', 2♀♀, vi-18-54, vi-21-54 (P. A. Opler, CAS, PAO); Dorrington, 2♂♂, iv-12-33 (CIS), 2♂♂, 1♀, vi-10-30 (AMNH); EL DORADO CO.: Echo Lake, 1♂, vii-22-63 (N. La Due, NLD); nr. Echo Lake,

2♂♂, 1♀, vii-6-40, vii-9-40 (CIS); Mt. Tallac, 9785', 1♂, vii-27-39 (F. H. Rindge, AMNH); Wright's Lake, 1♂, vii-2-48 (J. W. MacSwain, CIS). MARIPOSA CO.: w mi. n Bear Vy., Hwy. 49, 1♂, iv-17-61 (Opler, PAO), 1♂, 1♀, iv-26-65 (R. E. Stanford, Hughes-Stanford Coll'n); Boundary Hill, Yosemite, 1♂, vii-10-54 (R. P. Allen, CIS); El Portal, 3♂♂, 1♀, iv-11-64 (Opler, PAO), 2♀♀, iv-27-21, vii-2-21 Stanford-Highes Coll'n); Glacier Pt., 2♂♂, vi-28-21, vii-2-21 (J. A. Comstock, LACM); above Indian Flat, 21♂♂, 7♀♀, iv-14-63 (La Due, NLD); 1/2 mi. E May Lake, Yosemite N. P., 8900', 1♂, vii-4-46 (F. H. Rindge, AMNH); Tamarack Flat, Y. N. P., 1♂, vii-3-54 (Tilden, JWT); Wawona, 2♂♂, v-25-? (L. B. Woodruff, AMNH); Yosemite Vy., 3880-4000', 1♀, vi-1-38 (R. M. Bohart, CAS), 1♂, vi-3-38 (N. Hardman, AMNH). NEVADA CO.: Donner Pass, 1♂, vii-4-62 (J. Powell, CIS). PLACER CO.: locality unown, 1♀ (AMNH), 3♂♂, 2♀♀, "June" (Koebele, CAS); nr. Auburn, N. Fk. American River, 800', 20♂♂, 4♀♀, iv-18-61, iv-21-63, iv-22-63, iv-23-62, v-1-67 (La Due, NLD); Mt. Judah, north slope, 2♂♂, vii-16-63, viii-6-63 (La Due, NLD). PLUMAS CO.: Feather River, 1♂, iii-25-30 (R. Wind, JWT). SIERRA CO.: Bassets, 1♀, vii-8-67 (Opler, PAO); Gold Lake, 2♂♂, 3♀♀, vii-14-21, vii-15-25, vii-16-21 (J. D. Gunder, AMNH), 2♂♂, vii-1-35, vii-10-35 (L. M. Martin, LACM); 1♂, vii-2-63 (La Due, NLD), 1♂, vii-19-67 (O. Shields, O OAS), 1♂, vii-8-67 (Opler, PAO); 3 mi. E Gold Lake, 1♂, vii-1-61 (D. Dirks, OAS); Salmon Lake, 2♂♂, vii-27-? (CAS); Shenanigan Flat, 2♂♂, vi-17-67 (Opler, PAO); Yuba Pass, 1♀, vi-28-60 (Tilden, JWT). TULARE CO.: Sequoia N. P., 1♂, iv-10-30 (CAS). TUOLUMNE CO.: Hog Ranch, 4600', 1 mi. E Mather, 1♀, vi-23-64 (O. Shields, OAS); nr. Sonora Pass, 5♂♂, 2♀♀, vi-20-47 (C. D. MacNeill, CIS); Strawberry Lake, 1♀, vi-10-32 (CAS); Tuolumne River, nr. Tuolumne City, 1♂, iv-17-61 (P. A. Opler, PAO), 1♂, iv-27-65 (R. E. Stanford, Hughes-Stanford Coll'n). NEVADA, DOUGLAS CO.: Kingsbury Grade, 1♀, vi-18-67 (Opler, PAO).

Euchloe hyantis, Mt. Pinos Block segregate

CALIFORNIA, KERN CO.: Lebec, 1♂, vii-8-56 (Opler, PAO); Sand Springs, 6000', 1♂, v-28-39 (Rindge, AMNH). VENTURA CO.: Chuchupate Rgr. Sta., 3♂♂, 2♀♀, v-1-59, v-5-59 (J. Powell, CIS), 1♂, 2♀♀, v-8-59 (P. D. Hurd, CIS), 4♂♂, v-14-60 (Spler, PAO); Cuyama, 1 Cuyama, 1♂, iv-8-58 (R. P. Allen, CIS).

Euchloe hyantis, Peninsular Ranges segregate

CALIFORNIA, RIVERSIDE CO.: Palm Springs, 1♂, iv-3-25 (E. P. Van Dyke, CAS); Pinyon Flat, 1♂, iv-20-62 (MacNeill, Rentz, and Brown, CAS), 3♂♂, iv-13-63 (Langston, RLL), 2♂♂, 1♂, iv-7-63 (Langston, CIS), 1♂, iv-12-63 (G. Tamaki, CIS);

Santa Rosa Summit, 7 mi. E Anza, 1♂, iv-18-62 (NacNeill, Rentz, and Brown, CAS). SAN DIEGO CO.: Agua Caliente, 4♂♂, 3♀♀, iv-6-50, iv-6-52, iv-14-51, iv-25-53 (Powell, CIS); 2 mi. SE Banner, 1♂, iii-31-63 (O. Shields, AOS); 3 mi. E Banner, 2500', 2♂♂, i-21-58, ii-9-58 (F. Thorne, PAO); Buckman Spring, 1♂, iii-14-63 (Powell, CIS); Descanso Rgr. Sta., 1♂, iii-30-61 (Langston, RLL); Horse Haven Gorge, Laguna Mts., 1♂, v-1-65 (O. Shields, AOS); Jacumba, 1♂, iv-9-52 (Powell, CIS); 3 mi. NW Jacumba, 1♂, 1♀, iii-31-63 (F. Thorne, PAO); 4 mi. E Jacumba, 3200', 1♂, iii-27-66 (O. Shields, AOS); Laguna Mtn. Recr. Area, 4♂♂, 1♀, iv-22-51, v-11-51 (Langston, RLL); Monument Peak, Laguna Mts., 3♂♂, v-11-52 (Langston, RLL); nr. Monument Peak, 1♂, iv-22-51 (Langston, RLL); Mt Laguna, 1♂, vi-21-63 (P. Welles, CIS); Pine Vy., 3600', 1♂, v-1-65 (O. Shields, AOS); Scove Cyn., 3 mi. N Mt. Laguna Jct., 1♂, iii-27-61 (Langston, CIS); Storm Cyn., Laguna Mts., 5500', 9♂♂, 1♀, iv-21/24-62 (F. Thorne, LACM, PAO).

Euchloe hyantis andrewsi Martin

CALIFORNIA, SAN BERNARDINO CO.: Cedar Pines, 1♂, v-13-28 (LACM); Crestline, 5000', 14♂♂, 2♀♀, v-26-40, vi-7-39, vi-10-49 (Rindge, AMNH), 5♂♂, 1♀ (W. T. Meyer, LACM, CIS, JWT); Crestview, 3♂♂, 1♀, v-24-42 (Rindge, AMNH); Fish Camp, 1♂, vi-18-36 (C. M. Dammers, LACM); nr Lake Arrowhead, 1♂, v-25-47 (C. Smith, CIS); nr. Lake Arrowhead, Crestline Hwy., 3♂♂, 2♀♀, v-19-35, 1♀, vi-15-36 PARATYPES, 7♂♂, 2♀♀, vi-8-36 TOPOTYPES (R. H. Andrews, LACM, JWT); Running Spring, 2♂♂, iv-2-40 (C. Smith, CIS), 1♂, v-25-47 (LACM); Sugarloaf Mtn., 8000', vic. Big Bear Lake, 1♂, vi-19-66 (J. Lane, JL).

Euchloe hyantis lotta Beutenmuller

CANADA, - BRITISH COLUMBIA, Cranbrook, 6♂♂, 5♀♀, iv-18-13, iv-19-13, iv-21-13, iv-27-13, v-2-10, v-5-10, v-30-11 (C. Garrett, AMNH); Lillooet, 2♂♂, iv-20-18, iv-28-17 (AMNH); Oliver, 2♀♀, iv-24/25-23 (AMNH).

UNITED STATES, - ARIZONA, GILA CO.: Globe 1♂, iii-30-41 (AMNH). MARICOPA CO.: Apache Lake, 1♂, iii-7-53 (G. W. Kirkwood, LACM). MOHAVE CO.: Peach Springs, 2♂♂, iv-12-40 (Rindge, AMNH). PIMA CO.: Brown Cyn., Baboquivari Mts., 1♀, iii-31-53 (L. M. Martin, LACM); Catalina Mts., 1♂ (AMNH); Fresno Cyn., Baboquivary Mts., 3♂♂, 1♀, iii-14-59 (K. Roever, JWT); Madera Cyn., 1♂, iii-28-61 (O. Shields, AOS), 4♂♂, 1♀, iv-2/3-53, iv-15-54 (L. M. Martin, LACM). SANTA CRUZ CO.: Patagonia, 2♂♂, iii-24-38 (CIS, JWT). YAVAPAI CO.:

Mingus Mtn., 1♂, iii-31-50 (D.L. Bauer, LACM). CALIFORNIA. INYO CO.: Aguerreberry Camp, 5320', 5♂♂, 1♀, iv-8-60, iv-20-58 (Langston, RLL); Alabama Hills, 6 mi. W Lone Pine, 8♂♂, 1♀, iv-9-60 (Langston, RLL); Alabama Hills, Tuttle Cyn., 3 mi. W Lone Pine, 1♀, iv-9-60 (Langston, RLL); Argus Mts., 2♂♂, 14♀♀, iv-?-1891, v-?-1891 (CAS); summit Argus Mts., Hwy. 190, 2♂♂, 2♀♀, iv-13-60 (Opler, PAO); nr. Haiwee Summit, 1♀, iv-1-47 (C. Smith, CIS); 5 mi. N Little Lake, 1♀, iv-10-62 (J. W. MacSwain, CIS); 9 mi. W Lone Pine, 1♂, iv-9-60 (Langston, RLL); Panamint Mts., 1♂, iv-?-1891 (CAS); 3 mi. E Skidoo, Panamint Mts., 5500', 1♂, iv-13-57 (Langston, RLL); Surprise Cyn., Panamint Mts., 1♂, iv-24-57 (J. Powell, CIS); Wild Rose Springs, Panamint Mts., 3500', 1♂, 1♀, iv-12-57 (Langston, RLL). KERN CO.: locality unknown, 1♀, iv-15-27 (J.S. Garth, AMNH); Mojave, 3♂♂, iv-15/17-38 (AMNH); 22 mi. E Mojave, 1♂, iv-1-26 (AMNH); 8 mi. W Mojave, 2♂♂, iv-11-58 (J. W. MacSwain, CIS); Red Cyn., Mojave Desert, 1♂, iv-18-30 (CAS); 9 mi. N Ricardo, east branch Last Chance Cyn., Hwy. 6, 1♂, iv-10-60 (C. A. Toschi, CIS); 5 mi. E Roamond, 1♂, iii-27-60 (K. Shea, PAO); Taft, 1♀, iv-?-? (AMNH) Walker Pass, 5200', 1♀, vi-17-67 (F. Thorne, PAO). LASSENCO : 1 mi. W Hallelujah Jct., 2♂♂, vi-17-67 (P. Opler, PAO). LOS ANGELES CO.: locality unknown, 1♂ (CAS), 1♂, v-?-? (CAS); Boquet Cyn., Sierra Madre Mts., 1♀, iv-12-25 (LACM); Desert Spgs., 2♂♂, v-7-63 (Langston, CIS); Littlerock, 11♂♂, 5♀♀, iii-17/25-28, iii-21/22-31, iii-21/iv-2-32, iii-25-33 (AMNH, CAS, LACM), 2♂♂, 3♀♀, iii-16-35, iv-12-36 (G. Heid, CAS), 3♂♂, 3♀♀, iv-6-39 (C. Smith, CIS); 2♂♂, iv-4-32 (R. W. L. Potts, CIS), 1♂, iv-?-36 (J. Fischer, RLL), 1♂, iv-20-50 (C. D. MacNeill, CIS), 35♂♂, 12♀♀, iii-28-64, iv-3/11-55, iv-9-60, iv-11/12-54 (P. Opler, PAO), 2♂♂, iii-25-59 (Tilden, JWT); nr. Littlerock, 2♂♂, iii-16-40 (C. Smith, CIS); nr. Littlerock Dam, 1♂, iii-30-41 (CIS); Llano, 3000', 1♂, iii-11-34 (LACM), 1♀, ii-15-37 (J. A. Comstock, LACM); Lovejoy Buttes, Mojave Desert, 2♂♂, iii-18-47, iv-6-41 (C. Smith, CIS); Mint Cyn., +♂♂, 2♀♀, iv-18-34, iv-20-28 (AMNH, LACM); Palmdale, 3♂♂, iv-5-30, v-1-37 (AMNH), 1♀, iv-14-27 (J. S. Garth, CIS), 1♂, iii-21-47 (LACM); Switzers, w♂♂, 1♀, iii-21-32 (W. A. Evans, CAS); Valyermo, 1♀, iv-3-38 (AMNH), 6♂♂, iii-28-37, iv-28-35 (G. Heid, CAS). MODOC CO.: 6 mi. W Alturas, 2♂♂, 1♀, v-23-56 (Langston, RLL); Cedarville, 1♀, vi-4-35 (E. C. Johnston, AMNH). MONO CO.: Mono Lake, 1♂, vi-17-19 (AMNH). RIVERSIDE CO.: 1 mi. N Desert Center, 1♀, iv-11-58 (W. E. Ferguson, CIS); Split Rock Tank, 1♂, iii-22-39 (AMNH). SAN BERNARDINO CO.: Adelanto, 1♂, iii-20-31 (C. M. Dammers, LACM); Baldy Mesa, 1♀, iv-9-37 (J. A. Comstock, LACM); Barstow,

1♂, iv-8-31 (CAS); above Bonanza King Mine, Providence Mts.,
 2♂♂, iv-7-66 (P. Opler, PAO), 17♂♂, 7♀♀, iii-15-67 (G.
 Gorelick, GG); 16 mi. SW Cima, 5000', 9♂♂, 2♀♀, iv-2-66
 (P. Opler, PAO); 1/2 mi. W Cotton wood Spring, 4000-5000',
 Granite Mts., nr. Essex, 4♂♂, iii-22-67 (O. Shields, AOS);
 Kramer, 1♂, iv-2-32 (AMNH); Mitchell Caverns, Providence
 Mts., 1♂, iv-10-52 (F. Thorne, FT); ridge just west of Mitchell
 Caverns State Park, 1♂, iv-14-65 (O. Shields, ACS); Paradise
 Vy., 2♂♂, 2♀♀ (CAS); Phelan, 5♂♂, 5♀♀, iv-10-38, iv-11-37,
 iv-15-33, iv-18-50 (AMNH, LACM), 3♂♂, 2♀♀, iii-28-35,
 iv-4-37, iv-13-35, iv-14-37 (F. Estes, AMNH), 5♂♂, 1♀, iii-20-31,
 iv-11-30, iv-18-30 (C. M. Dammers, LACM); 2 mi. S Phelan, 1♀,
 v-7-63 (CIS); Quail Springs, 1♂, iv-15-38 (AMNH); between
 Randsburg and Kramer, 10♂♂, 4♀♀, v-5-27 (T. Craig, CAS);
 San Bernardino, 1♀, iii-15-14 (V. L. Clemence, LACM); Sheep Ck.,
 5♂♂, 5♀♀, iv-22-28, iv-24-29 (LACM), 5♂♂, iii-20-31 (C. M.
 Dammers, LACM); Victorville, 2♂♂, 1♀, iv-18-31 (CAS), 1♂,
 1♀, iv-15-57 (Tilden, JWT); Upper Volta, Phelan, 1♀, iii-6-33
 (J. L. Sperry, CAS); Yucca Vy., 25 mi. W 29 Palms, 1♂, iv-8-55
 (F. Thorne, FT). COLORADO. MESA CO.: Black Ridge, 1♂,
 v-10-46 (AMNH), 1♂, v-17-61 (D. Eff, AOS); Black ridge Breaks,
 Frita, 1♂, vi-5-44 (CAS); Black Ridge, Coal Mine Point, 3♂♂,
 v-11-63 (O. Shields, AOS), 2♂♂, v-17/18-61 (D. Eff, AOS);
 Decil's Cyn., 5000', 2♀♀, iv-23-40 (AMNH); Glande Park, 7000',
 5♂♂, 2♀♀, iv-20-40 (AMNH). MONTEZUMA CO.: Mesa Verde,
 1♂, iv-21-40 (LACM). IDAHO. ADA CO.: Kuna, 6♂♂, 3♀♀ (AMNH).
 BINGHAM CO.: Blackfoot, 2♂♂, iv-18-? (AMNH). BONNER CO.:
 Priest River, 1♂, vii-9-20 (AMNH). NEVADA. county unknown:
 1♂ (AMNH). ORMSBY CO.: Eagle Valley, Carson City, 4700',
 1♀, v-10-61 (P. Herlan, NSM). WASHOE CO.: Reno, 1♂, v-9-18
 (LACM), 1♀, v-7-08 (F. Burns, LACM); hills 2 mi. N Reno, 1♂,
 vi-18-67 (P. Opler, PAO). WHITE PINE CO.: Mt. Wheeler, 4♂♂,
 v-19/24-29 (F. W. Morand, AMNH). NEW MEXICO. HILDALGO CO.:
 Rodeo, 1♂, 1♀, iii-9-38 (Tilden, JWT). RIO ARRIBA CO.: 1 mi. '
 E Capulin, 11♂♂, 1♀, iv-11-63 (J. Scott, AOS); Embudo, 1♂, iv-21-62
 (J. Scott, AOS). OREGON. BAKER CO.: Baker, 4♂♂, v-20-57,
 v-21-58 (J. H. Baker, AMNH). MALHEUR CO.: Huntington Rd.,
 Ontario, 1♀, iv-30-41 (CAS); nr. Rockville, 1♂, v-18-61 (J. Baker,
 AOS). UTAH. BEAVER CO.: Beaver Ck. Hills, 3♂♂, v-?-?,
 v-?-? (AMNH). JUAB CO.: Eureka, 9♂♂, 1♀, v-7/21-11 (T.
 Spalding, AMNH), 1♂, 2♀♀, v-29-20 (LACM). SALT LAKE CO.:
 Salt Lake City, 1♀, v-?-? (AMNH). TOOELE CO.: Stockton,
 3♂♂, 3♀♀, iv-29-07, v-6-28, v-11-09, v-30-07, vi-8-06 (T.
 Spalding, AMNH, JWT); North Willow Ck., Stansbury Mts.,
 5400', 2♂♂, v-15-63 (K. Tidwell, AOS). WASHINGTON CO.:
 Zion N. P., 1♂, iv-18-27 (CAS). WASHINGTON, BENTON CO.:
 Prosser, 1♂, iv-25-21 (W. Lord, LACM); 10 mi. NW Richland,

3♂♂, iv-14-62 (R. E. Woodley, AOS). CHELAN CO.: Port Columbia, 1♀, iv-16-? (CAS). DOUGLAS CO.: Dyer Hill, 1♀, v-7-55 (PAO). OKANAGAN CO.: Alta Lake, 2♂♂, iv-29-51 (A. Anderson, RLL); Brewster, 16♂♂, 11♀♀, iv-20-32, iv-18-54, iv-19-58, iv-28-58, iv-30-60, v-1-60 (J. W. Hopfinger, AMNH, JWT); Pateros, 1♂, 1♀, v-2-33 (W. C. Wood, AMNH), 2♂♂, 1♀, iv-23-33, v-10-32, v-15-32 (AOS, CIS). YAKIMA CO.: Priest Rapids, 500', 9♂♂, 3♀♀, iv-2-62, iv-5/8-66 (E. J. Newcomer, AMNH, PAO). WYOMING. TETON CO.: Jackson Hole, 1♂, v-20-24 (AMNH); Jackson Hole, Moose P. O., 1♂, 2♀♀, v-16-24, v-20-24, v-23-24 (A. B. Klots, AMNH).

ADDENDA

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CANADA. - ALBERTA. Banff, 1 ♀, vii-7-02 (J. Fletcher); Calgary, 9 ♂♂, v-29-14 (F.H. Wolley Dod); Elkwater, 1 ♀, vi-15-29 (J.H. Pepper); Fort Fitzgerald, 2 ♂♂, 1 ♀, vi-30-50 (W.G. Helps); Lethbridge, 2 ♂♂, v-29-29 (J.H. Pepper); Manyberries, 1 ♀, vi-4-56 (E.E. Sterns); McMurry, 2 ♂♂, vi-4-53 (W.J. Grown); Nordegg, 5 ♂♂, 2 ♀♀, vi-13/28-21 (J. McDunnough); Waterton Lakes, 1 ♂, vi-27-29 (J.H. Pepper), 2 ♂♂, 1 ♀, vi-20/27-33 (J. McDunnough), 1 ♂, vi-14-22 (C.H. Young). BRITISH COLUMBIA. Atlin, 2200', 13 ♂♂, 12 ♀♀, v-28/vi-24-55 (B.A. Gibbard & H. Huckel); Clinton, 9 ♂♂, 2 ♀♀, vi-10-38 (G.S. Walley); Fairview, 1 ♂, v-6-36 (A.N. Gartrell); Fort Nelson, 1 ♂, vi-10-48 (W.R. Mason); Fort St. John, 1 ♂, vi-12-27 (P.N. Vroom); Garnett Vy., Summerland, 1 ♂, v-13-33 (A.N. Gartrell); Grand Forks, 1 ♀, v-26-37 (J.K. Jacob); Hedley, 6 ♂♂, vii-21-33 (C.B. Garrett); Hedley, Nickel Plate, 5000', 6 ♂♂, 1 ♀, vii-16/17-53 (McGillis & Martin); Hope Mts., 6000', 1 ♂, viii-2-32 (A.N. Gartrell); Jesmond, 1 ♀, vii-17-37 (J.K. Jacob); Kamloops, 4 ♂♂, 3 ♀♀, vi-7-37 (J.K. Jacob); Kamloops, Mt. Lolo, 5 ♂♂, 4 ♀♀, v-31/vi-2-38 (G.S. Walley); Merritt,

3 ♂♂, v-15-37 (J.K. Jacob); Midway, 2 ♂♂, 1 ♀, v-27-37 (J.K. Jacob); Okanagan Falls, 1 ♂, v-15-53 (D.F. Hardwick); Oliver, 1 ♂, v-20-59 (R. Madge); Osoyoos, 2000-2500', 3 ♂♂, v-13-53 (Hardwick & McGillis), 6 ♂♂, 1 ♀, v-21-53 (J. Martin), 1 ♀, vii-1-53 (McGillis), 1 ♀, vi-8-53, 1 ♂, vii-3-53 (D.F. Hardwick), 3 ♂♂, 4 ♀♀, v-19-38 (J.K. Jacob); Osoyoos, Anarchist Mt., 2 ♀♀, v-8-36 (A.N. Gartrell); Pavilion Lake, 2 ♂♂, 1 ♀, vi-6-38 (J.K. Jacob); Seton Lake, 1 ♂, vii-29-33 (J. McDunnough); Shingle Crk., Penticton, 11 ♂♂, 8 ♀♀, vi-5-33 (J. McDunnough); Victoria, 1 ♂, iv-5-1885, 1 ♀, v-26-1882, 1 ♂, v-11-04 (No Collector), 1 ♀, vi-3-03 (G.W. Taylor). MANITOBA. Gillam, 15 ♂♂, 9 ♀♀, vi-16/vii-7-50 (J.F. McAlpine); Riding Mts., 1 ♂, vi-9-37 (W.J. Brown), 36 ♂♂, 5 ♀♀ (Brown & J. McDunnough). NORTHWEST TERRITORIES. Fort Smith, 1 ♂, v-30-51, 14 ♂♂, 10 ♀♀, vi-2/17-50 (J.B. Wallis); Hay River, 1 ♂, vi-14-51 (P.R. Ehrlich); Norman Wells, 7 ♂♂, 4 ♀♀, vi-10/vii-11-49 (S.D. Hicks), 1 ♀, vii-4-49 (W.R.M. Mason); Yellowknife, 7 oo, 4 oo, vi-13/30-49 (E.F. Cashman & R.R. Hall). ONTARIO. Beardmore, 15 mi. E., 2 ♂♂, vi-1-58 (P.D. Syme); Fort Williams, 2 ♀♀, vi-?-64 (No Collector). SASKATCHEWAN. Cut Knife, Atton's Lake, 4 ♂♂, 2 ♀♀, v-29-40 (A.R. Brooks); Cypress Hills, 1 ♀, vi-19-39 (A.R. Brooks); Harlan, 1 ♂, 2 ♀♀, v-26-40, 1 ♂, v-24-41, 2 ♂♂, 2 ♀♀, v-12/14-47 (P.F. Bruggemann); Nipawm Nat. For., 1 ♂, v-25-42 (F.H. Chermock). YUKON TERRITORY. Dawson, 1 ♂, 1 ♀, vi-10/21-49 (W.W. Judd); Dawson, 1500-2000', 11 ♂♂, 12 ♀♀, vi-8/vii-1-49 (P.F. Bruggemann); Pelly River, below Hook River, 1 ♀, vii-5-07 (J. Keele); Rampart House, 1 ♀, vi-8-51 (C.C. Loan); Ross River, 132° 30', 61° 56', 3000', 1 ♂, 1 ♀, vi-21-60 (J.E.H. Martin); Whitehorse, 1 ♂, vii-4-48 (W.R. Mason), 3 ♂♂, 1 ♀, vi-1-49 (P.F. Bruggemann), 1 ♂, vi-10-49 (D.A. Mitchell), 2 ♀♀, vi-6/21-49 (D.L. Watson), 1 ♂, 1 ♀, ?-?-21 (E.P. Hawes).

UNITED STATES. - ALASKA. Big Delta, 4 ♂♂, v-28/vi-18-51 (Mason & McGillis); Moose Pass, Kenai Peninsula, 3 ♂♂, 2 ♀♀, vi-20/vii-2-51 (W.J. Brown); Richard Hwy., Mile 270, 3 ♂♂, vi-4-65 (Mason & McGillis); Richard Hwy., Mile 275, 3 ♂♂, 1 ♀, vi-6-51 (Mason & McGillis).

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CANADA. - ALBERTA. Banff, 1 ♂, vii-7-02 (J. Fletcher), 1 ♀, vii-1-07, 1 ♀, vi-25-08 (F.H. Wolley Dod); Banff Nat. Park, 3 ♂♂, 2 ♀♀, vii-9-55 (Brown, McGillis & Shewell); Canyon Crk., 4000', 1 ♀, vii-1-65 (J.R.H.); Hillcrest, 1 ♂, 1 ♀, vi-20-20 (No Collector); Laggan, 1 ♂, No Date (T.E. Bean); Laggan, Mt. Pinair, 7000', 1 ♂, 1 ♀, vii-17-07 (F.H. Wolley Dod); Moraine Lake, 1 ♂, vii-20-38 (G.S. Walley); Nordegg, 3 ♂♂, 3 ♀♀, vi-10/22-21 (J. McDunnough); Sunwapta Pass, 6600', Banff-Jasper Hwy., 1 ♂, vii-9-55 (R. Coyles); Waterton Lakes Park, 1 ♂, vii-2-22 (C.H. Young). BRITISH COLUMBIA. Atlin, 2200', 5 ♂♂, vi-6/26-55 (R.A. Gibbard & H. Huckel); Atlin, 4000', 1 ♂, vii-26-55 (H.J. Huckel); Golden, 1 ♀, v-29-64 (J.R.H.); Kootenay Park, Vermillion River, base of Mt. Gray, 4800', 1 ♀, vii-15-55 (R. Coyles); Summit Lake, Mile 392, Alaska Hwy., 7 ♀♀, vi-20/vii-8-59 (R.E. Leech & E.E. MacDougall). NORTHWEST TERRITORIES. Cameron Bay, Great Bear Lake, 2 ♂♂, 1 ♀, vii-3-37 (T.N. Freeman); Fort Reliance, Great Slave Lake Region, 1 ♀, vii-6-24 (J. Russell); Great Slave Lake Region, 1 ♂, vi-10-22 (J. Russell); Norman Wells, 4 ♂♂, 1 ♀, vi-9/15-49 (W.R.M. Mason); Reindeer Depot, Mackenzie Delta, 11 oo, 3 oo, vii-1/12-48 (W.J. Brown & J.R. Vockeroth); Saw Mill Bay, 10 ♂♂, vi-18/21-48 (D.F. Hardwick); Yellowknife, 1 ♀, vi-18-49 (E.F. Cashman). YUKON TERRITORY. Aklavik, 1 ♀, vi-16-53 (C.D. Bird);

Old Crow, 1 ♂, vii-2-51 (C.C. Loan); Rampart House, 8 ♂♂, 1 ♀, v-31/vi-31-51 (C.C. Loan & J.E.H. Martin); Sheldon Lake, 131° 37', 62° 54', 3500', 1 ♂, vii-7-60 (J.E.H. Martin); Whitehorse, 2300', 1 ♂, vi-4-49 (P.F. Bruggemann).

UNITED STATES. - ALASKA. Anchorage, 2 ♂♂, vi-5-51 (R.S. Bigelow); Kenai Peninsula, Moose Pass, 2 ♂♂, vi-20/vii-2-51 (W.J. Brown).

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CANADA. - BRITISH COLUMBIA. Garnett Vy., Summerland, 3 ♂♂, 5 ♀♀, v-1/5-33 (A.N. Gartrell); Lillooet, 1 ♂, v-?-27 (A.W. Phair); Okanagan Falls, 2000', 3 ♂♂, v-9/15-53 (D.F. Hardwick); Oliver, 7 ♂♂, 4 ♀♀, iv-22/v-7-23 (C.D. Garrett), 3 ♂♂, 5 ♀♀, iv-22-33 (A.N. Gartrell), 1 ♀, v-16-38 (J.K. Jacob); Osoyoos, 2500', 3 ♂♂, 1 ♀, v-13-53 (D.F. Hardwick & J.R. McGillis); Osoyoos, Anarchist Mt., 1 ♀, v-7-36 (A.N. Gartrell); Penticton, 2 ♀♀, iv-20/26-31 (A.N. Gartrell); Summerland, 1 ♀, iv-20-31 (A.N. Gartrell).